PESTICIDES IN ZIMBABWE

Toxicity and Health Implications

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Legislation and Registration of Pesticides for Plant Protection in Zimbabwe

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Summary

Pesticides used in Zimbabwe are registered in terms of the Pesticide Regulations of 1977, under the provisions of the Fertilizer, Farm Feeds and Remedies Act (Chapter 111) and are placed in Group II or III of the Hazardous Substances and Articles Act (Chapter 322). The pesticides are divided into four classes depending on the basis of their acute oral lethal dosage (LD_{50}) and persistence after application. Green, amber, red and purple triangle pesticides have oral LD_{50} of greater than 2001, 501–2000, 101–500 and 0,1–100, respectively. By 1991, 268, 103, 85 and 96 formulated pesticides were registered in the green, amber, red and purple triangle categories respectively. The registration of pesticides is done by a Registrar in the Plant Protection Research Institute in collaboration with the Hazardous Substances and Articles Control Board. Protective clothing which is required when handling pesticides range from long-sleeved overalls and rubber gloves when mixing green triangle pesticides to a waterproof jacket and trousers, rubber boots and gloves, face shield or hood and a respirator when handling purple triangle pesticides.

Introduction

Pesticides are substances that contain active ingredients that prevent the establishment of plants, control or destroy plants, insects or pathogens, or stimulate or retard the rate of plant growth. The active ingredients in formulated pesticides include fungicides, insecticides, nematicides, acaricides, avicides, herbicides, arboricides, bacteriocides, molluscicides, rodenticides, any substance which is used for the control of pests and diseases of plants, and any substances which is used to retard or stimulate the growth of plants, but excludes substances which are intended for plant nutrition or for veterinary remedies and preparations (Government of Zimbabwe, 1972).

The hazardous nature of pesticides has resulted in most countries in the world regulating the distribution and use of pesticides to promote practices which encourage the safe and efficient use of pesticides, including minimizing adverse effects on humans and the environment and preventing accidental

poisoning from improper handling (Government of Zimbabwe, 1981a). The success of the safe and efficient use of pesticides depends on the level of cooperation between international organizations, governments of exporting and importing countries, manufacturers, trade associations, formulators and distributors, users and public sector organizations such as environmental groups, consumer groups and trade unions.

Pesticide legislation in Zimbabwe

The Fertiliser, Farm Feeds and Remedies Act (Chapter 111) of 1952 (Government of Zimbabwe, 1952) which is administered by the Ministry of Lands, Agriculture and Rural Resettlement prohibits the sale or distribution of pesticides unless they are registered with the Plant Protection Research Institute which is in the Department of Research and Specialist Services. The pesticides must be registered in terms of the Pesticide Regulations of 1977 (Government of Zimbabwe, 1977). Registered pesticides are classified in accordance with the Hazardous Substances and Articles Act (Chapter 322) of 1972 (Government of Zimbabwe, 1972) which is administered by the Ministry of Health. The pesticides are placed in Group II or III of the Harzadous Substances and Articles (Group II and III : General) Regulations of 1981 (Government of Zimbabwe, 1981a and b). In addition, the requirements for protective clothing have to appear on the pesticide label in accordance with the Hazardous Substances and Articles (Protective Clothing: Pesticides) Regulations of 1985 (Government of Zimbabwe, 1985) and the amount of protective clothing depends on the toxicity of the pesticide.

Pesticide registration in Zimbabwe

The first requirement before a pesticide can be considered for registration in Zimbabwe is that the pesticide should be registered in its country of origin. The application for registration has to be made by a resident representative of the company manufacturing the pesticide, who then becomes responsible for marketing the product in accordance with the regulations. All commercial formulations or pesticides for sale or distribution have to be registered. If the weight or composition of the active ingredients or any components of the pesticides are altered in any way from the declaration of the original registration form, the product must be re-registered.

The information required for registration is set out in form P (1) which has to be completed in triplicate and sent to the registering officer in the Plant Protection Research Institute with any other relevant data. Where applicable, three copies of the text of the label and two samples of the pesticide should be sent to the registering officer.

Information on physical properties and toxicology from recognized published sources can be accepted. Experimental data in support of claims made must be derived from experimentation over at least two or three seasons with research conducted under varying climatic conditions for extension of or new

registration, respectively. Extension of registration refers to pesticides which are already registered in Zimbabwe and registration is being sought on a new crop or pest. Registration of a pesticide is completed when a certificate of registration and a registration number are issued. The registration is valid for three years and has to be renewed by completing form F (2) at the end of the third year.

Colour categorization of pesticides

The registering officer, following a decision by the Hazardous Substances and Articles Control Board, will assign a colour (green, amber, red or purple) to each commercially available pesticide (see Fig. 1). The colour code is based mainly on acute oral lethal dosage for mice (LD_{50}) of the technical material, the strength of the formulation and the persistence of the material after application. The oral LD_{50}, a single dose expressed in milligrammes per kilogramme of body weight which, when given orally, is lethal to 50 per cent of the animals (mice) under test.

Green triangle pesticides

These are formulations with acute oral LD_{50} greater than 2001. These pesticides can be used without danger in the home or where stated as admixture to grain or other stored produce for human or animal consumption. These can be offered for sale by any shop or store. The word "caution" appears within the green triangle, and "harmful if swallowed" beneath the base of the triangle. The protective clothing required when mixing are long-sleeved overalls and rubber gloves (Government of Zimbabwe, 1985).

Amber triangle pesticides

These are formulations with an acute oral LD_{50} of 501–2000. These pesticides can be used in home gardens and for external use in the home. They can be offered for sale by a retailer if a specified part of the shop or store is set aside for the specific purpose of display, storage or sale of dangerous substances.

The word "danger" and a symbol of a skull and cross bones should appear within the amber triangle and the word "poison" beneath the base of the triangle. The protective clothing required when mixing and when spraying in some cases are: long-sleeved overalls, rubber boots, gloves and face shield.

Red triangle pesticides

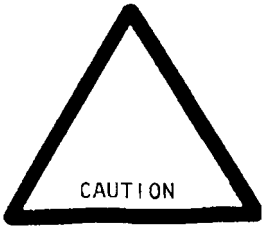
These are formulations with acute oral LD_{50} of 101–500. Their use should generally be restricted to horticultural, agricultural or industrial pest-control operations and only applied in the home by a recognised pest-control operator where specific precautions are taken and the insecticide has been registered for the particular purpose.

These pesticides may only be sold by a licensed dealer where a special part of the premises has been set aside for the specific purpose of display, storage and sale of dangerous substances.

Purple Triangle
Very Dangerous poison

Red Triangle
Dangerous poison

Amber Triangle
Poison



Green Triangle
Harmful if swallowed

Figure 1: Warning signs

The word "danger" and a symbol of a skull and cross bones should appear within the red triangle and the words "dangerous poison" beneath the base of the triangle. The protective clothing required when mixing such pesticides and, in some cases, when spraying are: long-sleeved overalls, rubber boots and gloves, face shield.

Purple triangle pesticides

These are formulations with oral LD_{50} of up to 100. These pesticides may only be sold to persons whose business, profession or trade require them. They may only be offered for sale by licensed dealers where part of the premises is set aside for the sale of dangerous substances. The dealer must keep a poison register of all sales of this group of pesticides, each sale being countersigned by the purchaser and the farm license number noted. This pesticide is sold only for use by qualified personnel and may not be used by the general public.

The word "danger" and a symbol of a skull and cross bones should appear within the purple triangle and the words "very dangerous poison" beneath the base of the triangle. Protective clothing required when handling such pesticides are: waterproof jacket and trousers, rubber boots and gloves, face shield or hood and a respirator in some cases.

Labelling

Labels are printed in English or Shona and Ndebele if the sale outlets are mainly in communal areas. Most labels have pictograms to cater for semi-literate farmers. On the front panel of the label, it should be stated whether the pesticide is intended for agricultural, horticultural, home garden, storage, indoor, public health or other uses.

The rate of application should be indicated according to the primary use. For example, home and garden use is based on a standard of 10 litres total spray volume and agricultural use is based on a standard of 100 litres total spray volume for conventional ground spraying. Recommendations in teaspoons, or tablespoons, should be avoided where possible and it is suggested that plastic measures should accompany small packs. This ensures that the farmers will use the correct measurements. For home and garden use, the range of pack size will generally be 100–1 000 ml for liquids and, 100 g to 2,5 kg for solids.

Safety intervals are indicated in bold type or colour. All pesticide labels have a triangle of the approved colour, centrally placed on the label, equidistant from either vertical side. The size of the triangle must not be less than one-twentieth of the entire label. Labels are approved by the registration officer before they are printed in bulk.

REGISTERED PESTICIDES

Green triangle pesticides

Brand Name	Brand Name	Brand Name
Abate 500E	A.B.C. Powder (dust)	Accotab
Actellic 50 E.C.	Aircraft aerosol	Afalon 50 w.p.
Agriseal	Alar 85	Alboleum
Allisan	Aliette	Ally
Alto 100 sl	Anthracol w.p.	Apolo 50 s.c.
Arsenal	Asulox 40	Atrazine 5 gr
Atrazine 50 fl	Atrazine 80 w.p.	Atrazine 80 % wp
Atrazine 500 F	Atrazine 500 F.W.	Bac-oil
Bac-Tac 79 % e.c.	Barfix	Basfapon
Basta 20 sl	Bavistin c	Bayfidan 1 % Gr.
Bayfidan 250 e.c.	Bayer Diuron 80 wp	Baygon Spray
Blattanex Spray	Copper Super Insect Killer	Copper Mosquito Larvicide
Copper		
Cosan Wettable Sulphur	Cotogard 500 f.w.	Cottonex 50 SC
Cottonex	Cottonex 80 w.p.	Crackdown
Cropotex f.w.	Cypam	Dalapon
Dalmex	Damfin 2 P	Decis 2,5 % f.w.
Deka	Deltanet 5G	Dipterex
Dimilin 25 w.p.	Dipterex 2 %	Dithane M-45
Dithane M-45 w.p.	Diuron 80 % w.p.	Diuron WeedKiller
Dual 720 e.c.	Dual 960 e.c.	Dusting Sulphur
Eptam Super	Ethrel	Faneron 50 w.p.
Faneron Super 50 w.p.	Finale Rat and Mouse-Killer	Flower Mosquito coils
Liquid conc.	Logran Extra 64.w.g.	Flower Mosquito Killer sticks
Fruitone – N	Fruitone – W	Funginex Fusilade W
G – 17 Garden Vegetable	Garden Insecticide-conc.	Garden Insecticide rfu
Dusting Powder	Gardomil 500 f.w.	Gesagard 500 f.w.
Gordona 50% w.p.	Gardoprim 80 w.p.	
Gesagram 500 f.w.	Gesaprim 500 f.w.	Gibberellic acid
Graingard 3 % Dust	Gramevin	Graslar 20p
Guard'n Care	Harakiri	Hate 4C
Igran 500 f.w.	Ingoitshi	Ingwe malathion 1% Dust
Kaptan 50 w.p.	Kaptasan F	Karathane 20 w.p.
Kaptasan F Super	Karathane 2% Dust	
Karathane 20 % w.p.	Kelthane	Kerb 50 w.p.
Killem Insect Aerosol	Kudzivirira mbesa	Laddok

Lasso e.c.
Lime sulphur 25 % w.p.
Malathion 25 % w.p.
Mesurol Snail Pellets
Monceren combi
Mositox Ready for use
Neorn 500 e.c.
New P44
Orchard oil
Pentac Aquaflow
Pix
Pree
Prometryne
Pythion 21
Ridomil 5G
Ronstar flo
Rovral 250 s.c.
Safrotin 2 % dust
Seradix
Simazine 80 w.p.
Snail & Slug Pellets
Sprayquip stalkborer 2% granules
Sting
Sukerkil
Sumisclex 50 w.p.
Swat
Target Insect Killer
Tekner
Thionex granules
Tobacco Tox
Topsin-M
Track X Granuler
Trifluralin
Vitavax
Volaton cutworm bait
Whip 12 e.c.
Z.F.C. Kumeresa w.p.

Lasso
Malathion 1 % dust
Malathion
Mikal-M
Mortein (3)
Nabu
Neporox 505p
Nhovo
Orchex N 695
Pfizer Insect Killer
Plantavax
Prime +125 EC
Propargite 30 w.p.
Razor
Rizolex 50 w.p.
Roundup (Driveweeder)
Rovral
Satisfar 1 % dust
Shelltox
Snails & Slug Killer
Spar Knock Down
Sprayquip Sucker Plucker
Stomp 500 E
Sulphur 80 w.p.
Summer oil
Tabamex Plus
TCA 90 Gra Skiller
Terbutyne 50 e.d.
Thionex 1 % granules
Topas 100 e.c.
Topsin-M 50 w.p.
Tribunil 70 % w.p.
3-0 - T Vine Dusting
Vitavax Plus
Vondozeb f.w.
Z.F.C. Fair 85
Zorial 80

Lime sulphur
Malathion 5 % dust
Malathion 50 e.c.
Modown
Morestan 25 % w.p.
Nata
New Formula
Omite 40 w.p.
Pedza Nhamo
Pilot SC
Previcur N
Prime +250
Pyspray malathion 5 %
Bindu Dusting powder
Roundup

Royaltax-M
Sencor 70 % w.p.
Shumba 2 dust
Dispersion
Special Bythion 21
Sprayquip tak
Steriseal
Storm
Sumifly
Super Kellem
Target (3)
Tecto Flowable
Tetradifon 8 e.c.
Tilt 250 e.c.
Topogard 50 w.p.
Track Chemical "X"
Trif
Sulphur

Wettable sulphur
Z.F.C. Fair Tax

Amber triangle pesticides

Afugan 30 e.c. Agridust	Agrithrin 20 e.c.	Akar 50 e.c.
Ametryne 80	Ametrex 80 w.p.	Ametryn
	Amitrol	Anti-Kil
Anti-Killer	Archer Insect Killer	Archer Surface Spray
Avenge	Banvel	Baygon Bait
Basagran	Baycor	
Bayleton e.c.	Bayeton 25 w.p.	Baythuion 50 e.c.
Byathroid 5 % S.L.	Bladex 5 s.c.	Blazine 5
Carbaryl 85 S	Carbaryl 85 W.P.	Chlordasol 30
Citrocyclin 90	Chlorobenzilate 50 e.c.	Copper fungicide
Copper oxychloride 85 %	Copper oxychloride 85 w.p.	Copper oxychloride 50 w.p.
Cooper D.B.M. Conc.	Cooper Fly Bait	Cupravit
Croak	Croneton e.c. 500	
Curacron 500 e.c.	Daconate 6	Danex 95 sp
Dead Ant 30	Dedrat	Dicofol 40 E.D.
Di fli Bat	Dipterex 95 s.p.	Duststab 0,5 % gran
Dormex	Dyant	Dyrene
Dyrene 75 % w.p.	Euparen 50 w.p.	Fastac 10 e.c.
Flex	Flytak s.c.	Flyfanon 1000 e.c.
Gamatox House Spray	Gesapax 80 w.p.	Gesapaz 500 f.w.
Glossinex 200 s.c.	Hoelon 36 e.d.	Kilathion 100 e.c.
Kocide 101	Lawnweeder	Maize 5 s.c.
Marshall Suscan	Mavrik 2 E	M.C.P.A.
MCPA-K Salt	Metason	Milraz 76 w.p.
Mitac	MSMA	Norax Ready Mixed
Oncol 10G	Othene 75 s.p.	Planavin 75 % w.p.
Polyram combi w.p.,	Previcur	Ratkil
Rattex	Reskol	Ridant
Ridomil Plus 50 w.p.	Ridomil MZ 72 w.p.	Ronstar
Saftrotin	Savin 85	Sevkol 27 % e.c.
Silmirin	Sumithion 40 w.p.	Surcopur 350 e.c.
Termistop	Thiulin Seed Dressing	Tillam
Tillatox	Trigard 75 w.p.	Tritifix
Ustilan	Vapona 90 Day strip	Weedkiller M
Wood Presentative		

Red triangle pesticides

Actril D.S.	Agri Seed Dress	Agrithrin Super
Alfacron 50 w.p.	Thiram 75 %	5 BC
Alfacron 50 w.p.	Ancrack	Anthio 33 e.c.
Atlas AA	Baygon 20 e.c.	Bolstar 720 e.c.
Brestan 60 w.p.	Buctril 21	Capsine DNOC
CCC Growth Regulant	Cel Termite Poison	Chematect
Chemicide No. 2	Chemicide No. 6	Chlormequat 40
Cooper Cockroach Killer	Cybolt 100 m.e.	Cybolt 100 e.
Cycocel 40	Cymbush 3 ED	Cymbush 20 e.c.
2,4-D Amine 48 %	2,4-D Amine 7,2	2,4-D Sodium Salt
Decis 2,5 e.c.	Diaz 30	Diazinon 30 e.c.
Dimethoate 40 e.c.	Dimethoate 40 3 %	DNOC Winter oil
Drop	DunTer 50 w.p.	Dursban 4 E
Dynamec	Folithion 60 e.c.	Gale 500 e.c.
Goal 24 e.c.	Karate	Insectigas
Kelthane e.c.	Kelthane 18,5 e.c.	Kontakil
Larvin 375 f.w.	Lebaycid 50 %	Meltatox
Metasystox R 25 % e.c.	Metasystox (i) 25 e.c.	Morocide 50 p%
Multi Benhex	Nurelle 200 e.c.	Omite e.c.
Oncol 9001	PCP /zn concentrate	Pirimor 50 DG
Pirimor 5 ED	Fyrinex 48 e.c.	Quelatox 40 % e.c.
Queletox 60 l	Raumin Rat Poison	Ripcord 20 e.c.
Rogor C.E.	Rubigan 8 e.c.	Sappco BC 6
Shellamine 7,2	Tabamex 360	Talstar 10 e.c.
Tartar emetic	Thiran 80 % w.p.	Thiram 80 w.p.
Tordon 22 K	Tordon 101 Mixture	Tordon 101

Purple triangle pesticides

Agrifume EDB 4,5
Aldrin 40 % w.p.
Aldrex 40 % w.p.
Ald-Selkkte 20
Azodrin 40
Birlane 24 e.c.
Birlane 25 w.p.
Brom-O-Gas
Celphos
Curater
Cyanogas
Dacamox 5 g
Dedevap 1000
DDVP 100 E
Detia-Gas-Ex-B
Detia-Gas-Ex-TG
Diazinon DFF
Disyston 5 % w.p.
Dieldrin 50 % w.p.
Dieldrex 56 s.c.
Disyston 5 % gran
Di-trapex
E.D.B. 4,5
E.D.B./EC
E.D.B. Tech
E.D.B. 92 e.c.
E.D.B. W.M.
Ekatin 25 % e.c.
Ethylene 100 %
Folidol 25 % w.p.
Folidol 50 % e.c.
Furadan 10 granules
Fumigas 10
Fumigas 15
Fumigas 90
Gastoxin
Gramoxone
Gusathion 35 w.p.
Kilval
Lannate
Maggot Spray
Magtoxin plates
Methyl Bromide
Methyl Bromide fumigant
Micro EOB
Microfume
Monocron
Minifume EDB
Mocap 10 G
Monocron
Monocrotophos 40
Nemacur 10 % granule
Nemacur 40 % e.c.
Nogos 50 e.c.
Nogos 100 e.c.
Nuvacron 40 WSC
Oftanol 50 % e.c.
Parathion 25 w.p.
Parathion 50 e.c.
Phosdrin
Phostoxin
Promet 666 sco
Repulse 5,75 gr
Shell D-D Soil Fumigant
Shell D-D 92 soil fumigant
Sheldrite Soil Poisoner
Solvirex Super 10
Tamaron 600
Technical EDB
Telone 11 soil fumigant
Temik 15G
Germiticides "A"
Thiodan 20 e.c.
Thiodan 20 ul vt
Thiodan 30 ul vt
Thiodan 30 e.c.
Thiodan 35 M.D.
Thiodan 35 % M.O.
Thiodan 50 w.p.
Thiodan 50 per cent w.p.
Thinex 35 e.c.
Thiourea
Tordon 155
Bushkiller
Ultracide 40 e.c.
Vapona
Vydate L
Water Miscible E.D.B.

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